

During July, 1894, 59 lives were lost and 94 persons injured; 41 barns, with a minimum loss of \$45,000, were struck; 33 dwellings, 12 churches, 2 academies, 3 mills or factories, and 2 railroad depots were struck; 24 horses, 13 cows, 5 mules, and 6 sheep were killed.

For purposes of comparison Mr. McAdie gives the following statement of the deaths due to lightning, so far as collected by the U. S. Weather Bureau, for the month of July during successive years, viz: 1890, 55; 1891, 52; 1892, 67; 1893, 73; 1894, 59.

OBSERVATIONS ON THE GREAT LAKES.

REPORTS FROM VESSELS.

The Lake Marine Section of the Forecast Division has received reports from the captains of 63 vessels navigating the Great Lakes. The following miscellaneous items are extracted from their reports:

Capt. Wm. Thorne, steamship *North Star*, 30th, aurora seen while off White Fish Point; first seen at 10.30 p. m. and continued for about one hour.

Capt. J. L. Weeks, steamship *City of Genoa*, 7th, buoy out of place in Sault River. 30th, Duck Island, Sault River, red buoy gone.

Capt. E. T. Rattray, steamship *Specular*, 9 p. m., 7th, to 3 a. m., 8th, northern lights in northern Lake Michigan.

Capt. W. S. Hoag, *Barge 130*, 1st, eastern Lake Superior, northern lights.

Capt. F. A. Graves, steamship *Matoa*, 2d, Middle Island, northern lights.

Capt. Donald McLean, steamship *City of Duluth*, 7th, southeast Lake Superior, northern lights.

Capt. D. Q. Bordeaux, steamship *H. J. Jewett*, 7th, Straits of Mackinac, northern lights.

Capt. G. B. Mallory, steamship *Mariposa*, 30th, eastern Lake Superior, northern lights from 9.30 to 11 p. m.

Capt. H. Zealand, steamship *Simon Lanzell*, 1st, western Lake Superior, northern lights.

Capt. Thos. Hackett, steamship *Volunteer*, 5th, Lake Erie, northern lights; also 7th, in St. Clair River, northern lights.

Capt. R. J. Cowley, steamship *Roumania*, 7th, brilliant aurora near Mackinac Island.

Capt. W. P. Garden, steamship *Tioga*, 1st, southern Lake Michigan, northern lights.

REPORTS FROM U. S. LIFE-SAVING STATIONS.

Through the co-operation of the General Superintendent of the Life-Saving Service and the Secretary of the Treasury, the Weather Bureau has received monthly reports for the month of June from the keepers of 33 U. S. Life-Saving Stations on the Great Lakes.

SUNSHINE AND CLOUDINESS.

GENERAL REMARKS.

The quantity of sunshine, and therefore of heat, received by the atmosphere is a fundamental factor in meteorology; the quantity received by the atmosphere as a whole is very nearly constant from year to year, but the proportion received by the surface of the earth depends largely upon the distribution of cloudiness. The sunshine is now recorded automatically at about 38 regular stations of the Weather Bureau, either by its photographic or its thermal effects. The cloudiness is recorded by personal observations at all stations and is given in the column of "average cloudiness" in Table I.

SUNSHINE.

An instrumental record of sunshine has been kept during the month at 17 stations by means of the photographic sunshine recorder and at 21 stations by means of the thermometric sunshine recorder; the results of these observations are given in Table IV, for each hour of local mean time (not seventy-fifth meridian time). The stations recording the largest percentages of sunshine between the hours of 11 a. m. and 1 p. m. were: Baltimore, 94; Chicago, 95; Columbus, 94; Des Moines, 96.5; Detroit, 100; Salt Lake City, 96; San Francisco, 96.5; Tucson, 96.

The stations having the least percentage between these hours were: New Orleans, 58; Savannah, 55; Wilmington, 51.

The general average percentage for the whole month is given in the next to the last column of Table IV. The highest percentages were: Baltimore and Chicago, 85; Salt Lake City, 83; Columbus, Ohio, Des Moines, St. Louis, and Tucson, 82. The lowest percentages were: Wilmington, 36; Savannah, 48; New Orleans, 58.

CLEAR SKY.

The average cloudiness between sunrise and sunset, as based on numerous personal observations, is given for each Weather Bureau station in Table I; the complement of this average

cloudiness gives the observer's estimated percentage of clear sky, and these latter numbers are given in the last column of Table IV.

COMPARISON OF SUNSHINE AND CLEAR SKY.

The sunshine registers give the duration of direct sunshine whence the percentage of possible sunshine is derived; the observer's personal estimates give the percentage of area of clear sky. It should not be assumed that these numbers should agree, and for comparative purposes they have been brought together, side by side, in the following table, from which it appears that, in general, the instrumental record of percentages of duration of sunshine is almost always larger than the observer's personal estimates of percentages of area of clear sky; the average excess for this month is 9 per cent for photographic records and 14 per cent for thermometric records:

Difference between instrumental and personal observations of sunshine.

| Photographic stations. | | | | Thermometric stations. | | | |
|-------------------------|---------------|-----------|-------------|--------------------------|---------------|-----------|-------------|
| | Instrumental. | Personal. | Difference. | | Instrumental. | Personal. | Difference. |
| Tucson, Ariz..... | 82 | 55 | 27 | Baltimore, Md..... | 85 | 69 | 16 |
| Spokane, Wash..... | 80 | 58 | 22 | Chicago, Ill..... | 85 | 81 | 4 |
| Portland, Ore..... | 79 | 77 | 2 | Salt Lake City, Utah.... | 83 | 63 | 20 |
| Cincinnati, Ohio..... | 76 | 60 | 16 | Columbus, Ohio..... | 82 | 58 | 24 |
| Cleveland, Ohio..... | 76 | 58 | 18 | Des Moines, Iowa..... | 82 | 72 | 10 |
| Helena, Mont..... | 75 | 69 | 6 | St. Louis, Mo..... | 82 | 62 | 20 |
| Dodge City, Kans..... | 74 | 66 | 8 | Detroit, Mich..... | 79 | 68 | 11 |
| Kansas City, Mo..... | 74 | 67 | 7 | Key West, Fla..... | 78 | 55 | 23 |
| Washington, D. C..... | 74 | 65 | 9 | Philadelphia, Pa..... | 75 | 54 | 21 |
| Santa Fe, N. Mex..... | 72 | 55 | 17 | Boston, Mass..... | 73 | 49 | 24 |
| Bismarck, N. Dak..... | 71 | 75 | -4 | Buffalo, N. Y..... | 72 | 53 | 19 |
| Denver, Colo..... | 71 | 55 | 16 | Little Rock, Ark..... | 72 | 59 | 13 |
| Galveston, Tex..... | 71 | 71 | 0 | New Haven, Conn..... | 71 | 62 | 9 |
| Memphis, Tenn..... | 69 | 67 | 2 | Vicksburg, Miss..... | 69 | 70 | -1 |
| San Diego, Cal..... | 68 | 73 | -5 | Colorado Springs, Colo.. | 63 | 47 | 16 |
| San Francisco, Cal..... | 68 | 65 | 3 | Portland, Me..... | 63 | 41 | 22 |
| Eastport, Me..... | 63 | 52 | 11 | New York, N. Y..... | 62 | 48 | 14 |
| Savannah, Ga..... | 48 | 38 | 10 | New Orleans, La..... | 58 | 57 | -1 |
| | | | | Wilmington, N. C..... | 36 | 45 | -9 |
| | | | | Rochester, N. Y..... | 59 | 59 | 0 |